cows were fed cotton-seed-meal instead of bran, the cotton-seed-meal constituting about three-fifths of the grain ration, and about one-fourth the total food eaten. This conclusion is reached by two comparisons which substantially check. First, the yield of milk from the cows fed cotton seed-meal was compared with that of those fed bran; and, second, the yield of milk from the cows fed cotton-seed-meal was compared with that from the same cows fed bran. This is shown in the following table, which gives the milk produced daily per animal by four cows of each lot:

	Period I.	Period II.	Period III.
	pounds.	pounds.	pounds.
Lot I.	19.4	19.5	19.0
Lot II.	23.4	23.9	19.6

Lot I. during all these periods and Lot II. during period III. were fed a ration containing bran, while Lot II. during periods I. and. II. was fed a ration containing cotton seed-meal. We have not noticed this double method of comparing results being used in a feeding experiment heretofore. As the per cent of fat was not materially changed the quantity of butter fat was appreciably increased by feeding cotton-seed-meal in place of bran.

Butter was made both with the extractor and with the churn and deep cold-setting system, — twelve churnings with the extractor and four with the ordinary churn. With the extractor, the per cent of fat recovered was practically the same whether bran or cotton-seed-meal was fed. The per cent of fat recovered varied in ten "runs" with the extractor from 80.3 to 90.6 per cent, — averaging about 86 per cent. With the deep cold-setting system slightly more fat was left in the skim-milk and in the butter-milk when bran was fed.

Samples of butter made from eight lots of milk in which the grain ration was corn-meal and bran, and samples of butter made from the same number of lots of milk in which the bran was more or less completely displaced by cotton-seed-meal were rated by one or more commission merchants. A's score, who rated all the samples, is given in detail. He decided that the bran butter was 18 per cent better in body, 12 per cent better in smelling flavor, 9 per cent better in tasting flavor, 9 per cent better in salt, and 2.5 per cent better in color than the cotton-seed-meal butter. While there was considerable variation in opinion among the several judges, there was a general agreement that feeding cotton-seed meal reduced the quality of the butter.

The conditions of manufacture of the two kinds of butter were alike, but it is shown that cotton-seed-meal butter requires to be salted heavier than bran butter, and it is suggested that if more salt had been used in making the former as compared with the latter, the two kinds of butter might have been nearer equal in quality.

The average melting-point of eight samples of bran butter was 93° F., while that of eight samples of cotton-seed-meal butter was 99° F. The average per cent of fat was practically identical in both kinds of butter, being about 78 per cent.

SAVAGE RELIGION.

AT a meeting of the Anthropological Institute of Great Britain and Ireland, the president, Dr. Edward B. Taylor, read a paper on "The Limits of Savage Religion."

Dr. Taylor pointed out that, in defining the religious systems of the lower races so as to place them correctly in the history of culture, careful examination was necessary to separate the genuine developments of native theology from the effects of intercourse with civilized foreigners. This borrowing in some degree from the religious ideas inculcated by foreigners was generally admitted; but he said that he would show that it had taken place to a much greater extent than had been supposed. Especially through missionary influence since 1500, ideas of dualistic and monotheistic deities and of the moral government of the world had been implanted on native polytheism in various parts of the globe.

The mistaken attribution to barbaric races of theological beliefs really belonging to the cultured world, as well as the actual development among these races of new religious formations under cultured influence, had been due to three principal causes: (1) Direct adoption from foreign teachers; (2) the exaggeration of genuine native deities of a lower order into a supreme god or devil; (3) the conversion of native words denoting a whole class of minor spiritual beings, such as ghosts or demons, into individual names alleged to be those of a supreme good deity or a rival evil deity. Conspicuous among the cases of borrowing from the beliefs of a higher culture was the famous belief in the "Great Spirit" of the North American Indians. Philosophers had long been wont, on the strength of this belief, to point to the "poor Indian, whose untutored mind sees God in clouds, and hears him in the wind;" but that the "Great Spirit" belief was really the product of the tutored mind of the Jesuit missionaries in Canada was proved by their own records. In South America, among the tribes of the regions of the Orinoco, missionaries and travellers had recorded the names of great divine beings, good and evil, which, could they be received as native to these rude people, would prove that the religion of the lower culture involved a conception of a supreme creative being. Yet, when the names of these recorded deities were translated, the result threw light on their probable origin outside any native development of religion. They might variously be interpreted as "The Highest," "Lord of All," "Creator," and "Our Great Father;" and these were obviously to be attributed to the missionary teaching which had been going on for three centuries.

The Maipuri tribe explained to Father Gilij, who had written such valuable accounts of the Orinoco tribes, how their spirit Purrunaminari ("Lord of All") created man, and formed woman afterwards by extracting a rib from man during his sleep; and, further, how, again in accordance with Genesis, light was created before the sun. They had an account also reproducing the very details of the divine birth according to Christian dogma; and all this Father Gilij accepted as proof of sacred tradition having been preserved since the beginning of the human race, regardless of the fact that there had been intercourse with Europeans since 1535. These tribes had stories of a universal deluge, told as native traditions, with details plainly borrowed from European teaching, such, for instance, as the story of the great waters being sent by the "Creator," from which only one man escaped, and he in a canoe, whence he sent out a rat to see whether the water had fallen, the rat returning with an ear of Indian corn. Australia afforded much material for the illustration of the question in hand.

Since the period of European colonization, a crowd of alleged native names for the Supreme Deity and a great evil deity had been recorded. Bishop Salvado of the Benedictine Mission in West Australia gave an account of the savages' belief in an omnipotent creator called "Montogon" (believed to be a wise old man of their own race), and also in a malignant spirit, extremely feared, called "Chenga." This region

and its languages had years before been excellently described and studied by Sir George Grey and by Advocate-General Moore; and, from their records, it appeared that the natives spoke of a spirit, "Mittagong," who, was, however, an insignificant demon identified with phosphoric fungus. As for "Chenga," he was not an individual at all. The dead, or the spirits of the dead, were called "djanga," and this word was applied by the savages to the white men, whom they regarded as the spirits of their forefathers returned. This misapplication of the name of a class to a particular person was largely due to the fact that communication between savages and white men was carried on in dog-English, when a few words were strung together without particles or inflections. Thus the savage, living in terror of beings closely corresponding to our ghosts or demons, learned to use the word "devil" in connection with them. The white man, accustomed to the ideas of a dominant Satan, wrote the word in his note book with a capital letter, unconscious that he was thus converting the savage's simple belief in spirits into a dualistic religion where a great personal evil was opposed to the great good being.

The German Moravian missionaries who went into the interior of Victoria in 1850 recorded that they found among the natives a belief in a spirit, "Baiame," the creator of all things, who dwelt above the clouds. Mr. W. Howitt also described this "Baiame" as he found him, and gave the following account, told by a native sorcerer, who had, according to custom, gone to "Baiame" for instruction in the supernatural: "My father had said we will go to 'Baiame's' camp. He got astride of a thread, and put me on another, and we held by each other's arms. At the end of the two threads was 'Wambu,' the bird of 'Baiame.' We went through the clouds, and on the other side was the sky. We went through the place where the doctors go through, and it kept opening and shutting very quickly. My father said that, if it touched a doctor as he was going through, it would hurt his spirit, and, when he returned home, he would sicken and die. On the other side, we saw 'Baiame' sitting in his camp. He was a very great old man, with a long beard. He sat with his legs under him, and from his shoulders extended two great quartz crystals to the sky above him. There were also numbers of the boys of 'Baiame' and his people, who are birds and beasts." These details were in some respects of very native character, while in others recalling conventional Christian pictures of the Almighty.

After adducing other illustrations from the records of explorers in Australia and Tasmania, Dr. Taylor concluded his paper by saying that, in examining a good many savage religions, he had come to the same result. In the religion of the lower races the civilized observer found himself on a familiar ground among ghosts, fairies, devils, and deities of the sky, of the sun, and of the river. Therefore, native religions extended to the distinct appreciation of gods of high rank in a polytheistic system; but to go one step further, and to look for any ideas of one supreme good being and one potent evil being, was to get beyond the religion of the lower races altogether.

AGRICULTURAL LOSSES FROM INSECTS.[1]

AT the last meeting of the association, in Champaign, Ill., I had the honor of a conversation with assistant recretary, the Hon. Edwin Willits, and he mentioned that he was frequently asked for information as to the advisability of large expenditures for entomological purposes, and that, although entomologists frequently spoke of the large losses from insects, we did not provide politicians — and particularly himself — with data by which they could explain and justify these expenditures, which those who understood them knew to be of such enormous importance, and when we wished to point out the great injuries done by insects we had to go back continuously to old published records which we had all been quoting for upwards of ten or twenty years. Now we find upon investigation that accurate estimates of damage done by insects are exceedingly difficult to arrive at, and the figures are so large that we are rather afraid to quote them ourselves lest we should prevent rather than encourage investigation, and it has been the custom of entomologists to minimize the estimates for fear they should not be believed. Now the necessity has arisen, I think, and I lay it before the association for action, in the direction of gathering together some reliable recent statistics in a short form which may be printed for distribution, and which will cover the more important injuries to date, and the part the work of the entomologist has played in reducing injury or preventing loss, so that we may overcome this difficulty and provide legislators and ourselves with data with which to meet this argument. After a careful examination and great effort to obtain data I have found that there are certain of these large estimates which appear to be reliable. I think better results will follow the publication of a few quite reliable statistics, which may be taken as typical instances, than by accumulating a large number of items which would increase the chance of error and might not be read so carefully. By way of example, I will refer to the chinch bug. I have examined carefully the estimates which have been published concerning that particular insect, and the following are probably quite reliable and appear to have been made with due regard to all collateral considerations, as the increased value of the saved crops, the cost of remedial measures, and similar subjects.

In 1864 Dr. Shimer's estimate, which I find was drawn up with very great care, put the loss in the one State of Illinois to the corn and grain crops at $73,000,000. In Dr. Riley's "Reports on the Injurious Insects of Missouri," we find in 1874 there was a reliable estimate of the loss to that State by the same insect of $19,000,000 In 1887 Professor Osborn's estimate, founded upon the reports of the correspondents of the State Agricultural Society of Iowa, put the loss in that State on corn and grain at $25,000,000; and, last, Mr. Howard's estimate, as given in the entomologist's report for 1887, for the nine States infested by the chinch bug in that year, was $60,000,000.

Now, gentlemen, I think that these statistics of the injuries to crops by one insect alone are probably as reliable as any we can get, and they give a good argument which we may use as showing the depredations of insects; but it is not sufficient that we can convince people that great injury is going on, we must show that we are doing something to mitigate this injury. In Professor Comstock's report for 1879 the estimate of the possible loss in years of general prevalence of the cotton Aletia is placed at $30,000,000 through the cotton States. The injuries by grasshoppers in the different States of the Union, and also occasionally through the British North American provinces, have been so enormous that figures hardly give an idea of the injury they do, but they are known by all to be enormous.

As an instance, however, of what may be done to mitigate their attacks, I would merely mention those for this year,

[1] From address of James Fletcher, president, at the third annual meeting of the Association of Economic Entomologists.